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English translation 第1頁, 共1頁

JP6-40318

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CLAIMS

[Utility model registration claim]

[Claim 1] In the engine-cooling-water heat radiator which consists of a rectification object fastened between the radiator for engine cooling waters, an induced draft fan, and said radiator and fan. The blade of the shape of radii of two or more sheets which fastens said rectification object at a radial between an outer ring, an inner ring, and said outer ring and inner ring constitutes. Said blade is a radiator cooling system for induced draft fans characterized by having "0" thru/or the curvilinear configuration made minute for the revolution component of the airstream in a fan's outlet.

[Claim 2] The radiator cooling system for induced draft fans of claim 1 characterized by equalizing wind-speed distribution of a radiator by equipping with a cone in the inner ring of a rectification object.

[Translation done.]

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EXAMPLE

[Example]

The example of the radiator cooling system for induced draft fans applied to below at this design is explained with reference to a drawing. Drawing 1 is the perspective view of a rectification object, and the rectification object 10 fastens the blade 3 of the shape of radii of 20-30 sheets to a radial between the inner circumference of the outer ring 1, and the periphery of an inner ring 2, and equips with a cone 4 in an inner ring 2. Said outer ring 1 has fixed to the shroud 7 through two or more mounting brackets 5 and 6. What is necessary is for there to be especially no constraint in the configuration, dimension, and installation location of said mounting brackets 5 and 6, and just to be able to fix the rectification object 10 to a shroud 7.

[0008]

The mimetic diagram and drawing 3 as which drawing 2 regarded the circumference of a rectification object from the side face are the mimetic diagram having shown superficially the relation between the rectification object in the case of radiating heat in an engine cooling water using an induced draft fan, and a fan. In order to lead the blade 3 of the rectification object 10 to a fan 8, without giving resistance to the airstream absorbed by the core of a radiator 9 by rotation of a fan's 8 blade 8a, it is being fixed to the include angle to which radiator side edge tail 3a becomes perpendicular to the end face of a radiator 9, i.e., the include angle which becomes parallel to center line X-X of a radiator 9 in drawing 3. The curvilinear configuration of a blade 3 is equipped with "0" thru/or a curvilinear configuration which is made minute for the revolution component of the airstream in a fan's outlet, and is the include angle theta 1 of fan side edge tail 3b and radiator center line X-X to make. For example, it is 50-60 degrees and fan side edge tail 3b is being fixed upward in drawing 3. A fan's 8 blade 8a is the 50-60-degree angle of torsion theta 2 as opposed to radiator center line X-X. It has and rotates down the drawing. By rotation of blade 8a, the air inhaled from the way outside the radiator 9 passes along the opening of a radiator 9 prepared in parallel with radiator center line X-X, and flows into the rectification object 10. And it progresses along the curved surface of a blade 3, and flows to an engine side by blade 8a.

[0009]

When the above-mentioned rectification object is fastened between a radiator and an induced draft fan, the velocity diagram in a fan inlet becomes like drawing 4. It sets to this drawing and is w1. Fan inlet relative velocity and c1 Fan inlet absolute velocity and v1 An average wind speed and U are a fan's rotational speed (peripheral speed). Moreover, the velocity diagram in a fan outlet becomes like drawing 5. It sets to this drawing and is w2. Fan outlet relative velocity and c2 It is fan outlet absolute velocity. It is deltaPfan about a part for a static pressure rise according to a fan when a rectification object is arranged so that the revolution component l may be set to "0". If it carries out and air density is set to rho deltaPfan = 1 / 2xrho (w12-w22)

$$= 1/2xrho \{ (U+l) 2-U2 \}$$

$$= 1/2xrho (2 Ul+l2) \dots (1)$$

It becomes. On the other hand, the velocity diagram in the fan inlet when not arranging a rectification object between a radiator and an induced draft fan becomes like drawing 6. Setting to this drawing, for w1', fan inlet relative velocity and c1' are fan inlet absolute velocity and v1. And U is the same as that of the case of drawing 4. Moreover, the velocity diagram in a fan outlet becomes like drawing 7. In this drawing, fan outlet relative velocity and c2' of w2' are fan outlet absolute velocity. It is a part for the static pressure rise by the fan deltaP'fan If it carries out, and a revolution component is set to l and air density is set to rho deltaP'fan = 1 / 2xrho (w1'2-w2'2)

$$= 1/2xrho \{ U2-(U-l) 2 \}$$

$$= 1/2xrho (2 Ul-l2) \dots (2)$$

It becomes. Difference of the above-mentioned (1) formula and (2) types deltaPfan-deltaP'fan =rho l2 > If this rectification object is fastened between 0 therefore a radiator, and an induced draft fan, rather than the case where a rectification object is not fastened, the static pressure by the fan will rise and airflow will increase by static pressure rise. Moreover, wind-speed distribution can be equalized with the cone arranged in the core of a rectification object.

[0010]

If acoustic material is stuck on the blade front face of a rectification object, the noise component in which the flowing airstream has the inside of the duct formed with a shroud and a rectification object is absorbed by said acoustic material, and the noise can be reduced.

[0011]

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MEANS

[Means for Solving the Problem]

In order to attain the above-mentioned purpose, the radiator cooling system for induced draft fans concerning this design In the engine-cooling-water heat radiator which consists of a rectification object fastened between the radiator for engine cooling waters, an induced draft fan, and said radiator and fan The blade of the shape of radii of two or more sheets which fastens said rectification object at a radial between an outer ring, an inner ring, and said outer ring and inner ring constitutes. Said blade shall be equipped with "O" thru/or the curvilinear configuration made minute for the revolution component of the airstream in a fan's outlet. Moreover, it sets to such a radiator cooling system. By equipping with a cone in the inner ring of a rectification object, it decided to equalize wind-speed distribution of a radiator.

[0006]

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Device]

When the conventional rectification object which arranged the circular fin of two or more sheets in concentric circular is used, there are the following troubles.

- (1) Since the sense of the airstream at the time of the inhaled open air coming out of the clearance between the fins of a radiator 9 is obliged to a turn in the clearance between fins like an arrow head B in the inlet-port section of the rectification object 12 to being parallel to parallel, i.e., center line X-X of a radiator, like the arrow head A shown in drawing 8, the rectification object 12 turns into a resistor to airstream, and airflow falls. In order to make said resistance small, the include angle theta of the circular fin 11 to radiator center line X-X must be made as small as possible, and shaft-orientations die-length L of the rectification object 12 must be enlarged very much. Moreover, if the number of sheets of the circular fin 11 is reduced, the effectiveness which makes wind-speed distribution of a radiator 9 homogeneity will fall.
- (2) Although it is necessary to form at least one stay 13 as shown in drawing 9 since the concentric circular circular fin 11 which constitutes the rectification object 12 is fixed to a position, respectively, this stay 13 also serves as a resistor of the flow of air, and causes the fall of airflow. Moreover, the flow of air is also confused.

[0004]

This design was made paying attention to the above-mentioned conventional trouble, and aims at offering the radiator cooling system for induced draft fans which can perform effective heat exchange by attaining equalization of increase of the airflow which passes a radiator, and wind-speed distribution.

[0005]

[Translation done.]

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EFFECT OF THE INVENTION

[Effect of the Device]

As explained above, while fastening the blade of the radii patagium of two or more sheets between an outer ring and an inner ring at a radial according to this design Since it equipped with the cone into said inner ring, the rectification object was constituted and the revolution component of the airstream of a fan outlet gave "0" thru/or a curvilinear configuration which is made minute to said blade The revolution component of the airstream in a fan outlet can be changed into the static pressure rise by the fan, and increase of airflow is attained. Moreover, wind-speed distribution of a radiator can be equalized with the cone with which it equipped in the inner ring. Thus, increase of airflow and equalization of wind-speed distribution of a radiator can perform heat exchange of an engine cooling water effectively.

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PRIOR ART

[Description of the Prior Art]

In order to radiate heat in the cooling water of the engine carried in the car system construction equipment, the automobile, the generator, etc., a radiator is formed near said engine, and when the airstream generated by the fan who rotates with rotation of an engine passes the core of said radiator, heat is radiated in the engine cooling water which flows down the inside of a core tube. Said fan's periphery was approached, the shroud was attached between the fan and the radiator, and airflow loss of a fan is prevented. And since the velocity distribution of the airstream which passes the core of a radiator is equalized and heat exchange is performed effectively, as shown in drawing 8 and drawing 9, the radiator cooling system which made the rectification object 12 which arranged the circular fin 11 of two or more sheets in concentric circular intervene between a radiator 9 and an induced draft fan 8 may be used.

[0003]

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TECHNICAL FIELD

[Industrial Application]

This design is related with the radiator cooling system for induced draft fans.

[0002]

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DETAILED DESCRIPTION

[Detailed explanation of a design]

[0001]

[Industrial Application]

This design is related with the radiator cooling system for induced draft fans.

[0002]

[Description of the Prior Art]

In order to radiate heat in the cooling water of the engine carried in the car system construction equipment, the automobile, the generator, etc., a radiator is formed near said engine, and when the airstream generated by the fan who rotates with rotation of an engine passes the core of said radiator, heat is radiated in the engine cooling water which flows down the inside of a core tube. Said fan's periphery was approached, the shroud was attached between the fan and the radiator, and airflow loss of a fan is prevented. And since the velocity distribution of the airstream which passes the core of a radiator is equalized and heat exchange is performed effectively, as shown in drawing 8 and drawing 9, the radiator cooling system which made the rectification object 12 which arranged the circular fin 11 of two or more sheets in concentric circular intervene between a radiator 9 and an induced draft fan 8 may be used.

[0003]

[Problem(s) to be Solved by the Device]

When the conventional rectification object which arranged the circular fin of two or more sheets in concentric circular is used, there are the following troubles.

(1) Since the sense of the airstream at the time of the inhaled open air coming out of the clearance between the fins of a radiator 9 is obliged to a turn in the clearance between fins like an arrow head B in the inlet-port section of the rectification object 12 to being parallel to parallel, i.e., center line X-X of a radiator, like the arrow head A shown in drawing 8, the rectification object 12 turns into a resistor to airstream, and airflow falls. In order to make said resistance small, the include angle theta of the circular fin 11 to radiator center line X-X must be made as small as possible, and shaft-orientations die-length L of the rectification object 12 must be enlarged very much. Moreover, if the number of sheets of the circular fin 11 is reduced, the effectiveness which makes wind-speed distribution of a radiator 9 homogeneity will fall.

(2) Although it is necessary to form at least one stay 13 as shown in drawing 9 since the concentric circular circular fin 11 which constitutes the rectification object 12 is fixed to a position, respectively, this stay 13 also serves as a resistor of the flow of air, and causes the fall of airflow. Moreover, the flow of air is also confused.

[0004]

This design was made paying attention to the above-mentioned conventional trouble, and aims at offering the radiator cooling system for induced draft fans which can perform effective heat exchange by attaining equalization of increase of the airflow which passes a radiator, and wind-speed distribution.

[0005]

[Means for Solving the Problem]

In order to attain the above-mentioned purpose, the radiator cooling system for induced draft fans concerning this design In the engine-cooling-water heat radiator which consists of a rectification object fastened between the radiator for engine cooling waters, an induced draft fan, and said radiator and fan The blade of the shape of radii of two or more sheets which fastens said rectification object at a radial between an outer ring, an inner ring, and said outer ring and inner ring constitutes. Said blade shall be equipped with "O" thru/or the curvilinear configuration made minute for the revolution component of the airstream in a fan's outlet. Moreover, it sets to such a radiator cooling system. By equipping with a cone in the inner ring of a rectification object, it decided to equalize wind-speed distribution of a radiator.

[0006]

[Function]

According to the above-mentioned configuration, the blade of an outer ring, an inner ring, and the radii patagium of two or

more sheets constitutes a rectification object. Since it shall have "0" thru/or the curvilinear configuration made minute, the revolution component of airstream [in / for the blade fastened to a radial between an outer ring and an inner ring / a fan's outlet] The revolution component of the airstream in a fan outlet can be changed into the static pressure rise by the fan, and increase of airflow is attained.

Furthermore, wind-speed distribution of a radiator can be equalized by equipping with a cone in the inner ring of said rectification object.

[0007]

[Example]

The example of the radiator cooling system for induced draft fans applied to below at this design is explained with reference to a drawing. Drawing 1 is the perspective view of a rectification object, and the rectification object 10 fastens the blade 3 of the shape of radii of 20-30 sheets to a radial between the inner circumference of the outer ring 1, and the periphery of an inner ring 2, and equips with a cone 4 in an inner ring 2. Said outer ring 1 has fixed to the shroud 7 through two or more mounting brackets 5 and 6. What is necessary is for there to be especially no constraint in the configuration, dimension, and installation location of said mounting brackets 5 and 6, and just to be able to fix the rectification object 10 to a shroud 7.

[0008]

The mimetic diagram and drawing 3 as which drawing 2 regarded the circumference of a rectification object from the side face are the mimetic diagram having shown superficially the relation between the rectification object in the case of radiating heat in an engine cooling water using an induced draft fan, and a fan. In order to lead the blade 3 of the rectification object 10 to a fan 8, without giving resistance to the airstream absorbed by the core of a radiator 9 by rotation of a fan's 8 blade 8a, it is being fixed to the include angle to which radiator side edge tail 3a becomes perpendicular to the end face of a radiator 9, i.e., the include angle which becomes parallel to center line X-X of a radiator 9 in drawing 3. The curvilinear configuration of a blade 3 is equipped with "0" thru/or a curvilinear configuration which is made minute for the revolution component of the airstream in a fan's outlet, and is the include angle theta 1 of fan side edge tail 3b and radiator center line X-X to make. For example, it is 50-60 degrees and fan side edge tail 3b is being fixed upward in drawing 3. A fan's 8 blade 8a is the 50-60-degree angle of torsion theta 2 as opposed to radiator center line X-X. It has and rotates down the drawing. By rotation of blade 8a, the air inhaled from the way outside the radiator 9 passes along the opening of a radiator 9 prepared in parallel with radiator center line X-X, and flows into the rectification object 10. And it progresses along the curved surface of a blade 3, and flows to an engine side by blade 8a.

[0009]

When the above-mentioned rectification object is fastened between a radiator and an induced draft fan, the velocity diagram in a fan inlet becomes like drawing 4. It sets to this drawing and is w1. Fan inlet relative velocity and c1 Fan inlet absolute velocity and v1 An average wind speed and U are a fan's rotational speed (peripheral speed). Moreover, the velocity diagram in a fan outlet becomes like drawing 5. It sets to this drawing and is w2. Fan outlet relative velocity and c2 It is fan outlet absolute velocity. It is deltaPfan about a part for a static pressure rise according to a fan when a rectification object is arranged so that the revolution component 1 may be set to "0". If it carries out and air density is set to rho

$$\text{deltaPfan} = 1 / 2x\rho (w_{12} - w_{22})$$

$$= 1/2x\rho \{ (U+l) 2 - U^2 \}$$

$$= 1/2x\rho (2 U l + l^2) \dots (1)$$

It becomes. On the other hand, the velocity diagram in the fan inlet when not arranging a rectification object between a radiator and an induced draft fan becomes like drawing 6. Setting to this drawing, for w1', fan inlet relative velocity and c1' are fan inlet absolute velocity and v1. And U is the same as that of the case of drawing 4. Moreover, the velocity diagram in a fan outlet becomes like drawing 7. In this drawing, fan outlet relative velocity and c2' of w2' are fan outlet absolute velocity. It is a part for the static pressure rise by the fan deltaP'fan If it carries out, and a revolution component is set to l and air density is set to rho

$$\text{deltaP'fan} = 1 / 2x\rho (w_{1'2} - w_{2'2})$$

$$= 1/2x\rho (2 U l - l^2) \dots (2)$$

It becomes. Difference of the above-mentioned (1) formula and (2) types deltaPfan-deltaP'fan = rho l^2 > If this rectification object is fastened between 0 therefore a radiator, and an induced draft fan, rather than the case where a rectification object is not fastened, the static pressure by the fan will rise and airflow will increase by static pressure rise. Moreover, wind-speed distribution can be equalized with the cone arranged in the core of a rectification object.

[0010]

If acoustic material is stuck on the blade front face of a rectification object, the noise component in which the flowing airstream has the inside of the duct formed with a shroud and a rectification object is absorbed by said acoustic material, and the noise can be reduced.

[0011]

[Effect of the Device]

As explained above, while fastening the blade of the radii patagium of two or more sheets between an outer ring and an inner ring at a radial according to this design Since it equipped with the cone into said inner ring, the rectification object was constituted and the revolution component of the airstream of a fan outlet gave "0" thru/or a curvilinear configuration which is made minute to said blade The revolution component of the airstream in a fan outlet can be changed into the static pressure rise by the fan, and increase of airflow is attained. Moreover, wind-speed distribution of a radiator can be equalized with the cone with which it equipped in the inner ring. Thus, increase of airflow and equalization of wind-speed distribution of a radiator can perform heat exchange of an engine cooling water effectively.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the perspective view of a rectification object.

[Drawing 2] It is the mimetic diagram which looked at a rectification object and its circumference from the side face.

[Drawing 3] It is the mimetic diagram having shown the relation between a rectification object and a fan superficially.

[Drawing 4] It is drawing showing the velocity diagram in the fan inlet at the time of fastening the rectification object by this design between a radiator and an induced draft fan.

[Drawing 5] It is drawing showing the velocity diagram in the fan outlet at the time of fastening the rectification object by this design between a radiator and an induced draft fan.

[Drawing 6] It is drawing showing the velocity diagram in the fan inlet when not arranging a rectification object between a radiator and an induced draft fan.

[Drawing 7] It is drawing showing the velocity diagram in the fan outlet when not arranging a rectification object between a radiator and an induced draft fan.

[Drawing 8] It is the mimetic diagram which looked at the rectification object of the former which arranged the circular fin in concentric circular, and its circumference from the side face.

[Drawing 9] It is the front view of the rectification object which arranged the circular fin in concentric circular.

[Description of Notations]

1 Outer Ring

2 Inner Ring

3 8a Blade

4 Cone

8 Fan

9 Radiator

10 12 Rectification object

[Translation done.]

(19)日本国特許庁 (J P)

(12) 公開実用新案公報 (U)

(11)実用新案出願公開番号

実開平6-40318

(43)公開日 平成6年(1994)5月27日

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F 01 P 11/10	C	8206-3G		
	K	8206-3G		
F 04 D 29/44	C	7314-3H		
F 28 F 9/00	Z	9141-3L		

審査請求 未請求 請求項の数 2(全 2 頁)

(21)出願番号 実願平4-82754

(22)出願日 平成4年(1992)11月5日

(71)出願人 000001236

株式会社小松製作所

東京都港区赤坂二丁目3番6号

(72)考案者 坪田 晴弘

神奈川県平塚市万田1200 株式会社小松製作所研究所内

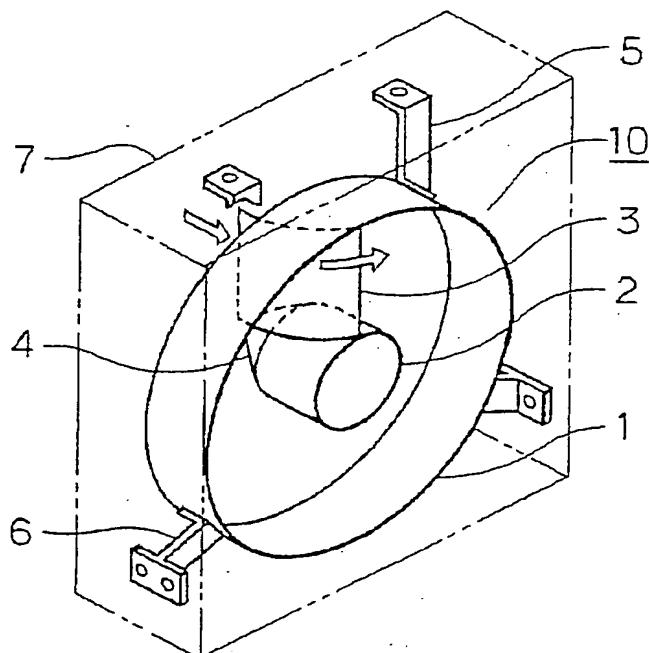
(74)代理人 弁理士 橋爪 良彦

(54)【考案の名称】 吸い込みファン用ラジエータ冷却装置

(57)【要約】

【目的】 吸い込みファンを用いたエンジン冷却水放熱装置において、ラジエータを通過する風量の増大ならびに風速分布の均一化を図り、有効な熱交換ができるようとする。

【構成】 アウターリング1とインナーリング2との間に複数枚の円弧翼状のブレード3を放射状に挿着して整流体10を構成する。前記ブレード3は、ファンの回転によってラジエータのコアに吸い込まれた空気流に抵抗を与えることなく、ラジエータ側端末部がラジエータに垂直となる角度に固定されている。ブレード3は、ファンの出口における空気流の旋回成分が“0”ないし微小となる曲線形状を有することにより、風量を増大させる。また、インナーリング2内に装着したコーン4により、ラジエータの風速分布を均一化させる。



【実用新案登録請求の範囲】

【請求項1】 エンジン冷却水用ラジエータと、吸い込みファンと、前記ラジエータとファンとの間に接着する整流体とからなるエンジン冷却水放熱装置において、前記整流体をアウターリング、インナーリングおよび前記アウターリングとインナーリングとの間に放射状に接着する複数枚の円弧状のブレードによって構成し、前記ブレードはファンの出口における空気流の旋回成分を“0”ないし微小とする曲線形状を備えていることを特徴とする吸い込みファン用ラジエータ冷却装置。

【請求項2】 整流体のインナーリング内にコーンを装着することにより、ラジエータの風速分布を均一化したことを特徴とする請求項1の吸い込みファン用ラジエータ冷却装置。

【図面の簡単な説明】

【図1】 整流体の斜視図である。

【図2】 整流体およびその周辺を側面から見た模式図である。

【図3】 整流体とファンとの関係を平面的に示した模式図である。

【図4】 本考案による整流体をラジエータと吸い込みファンとの間に接着した場合の、ファン入口における速度

三角形を示す図である。

【図5】 本考案による整流体をラジエータと吸い込みファンとの間に接着した場合の、ファン出口における速度三角形を示す図である。

【図6】 ラジエータと吸い込みファンとの間に整流体を配設しない場合の、ファン入口における速度三角形を示す図である。

【図7】 ラジエータと吸い込みファンとの間に整流体を配設しない場合の、ファン出口における速度三角形を示す図である。

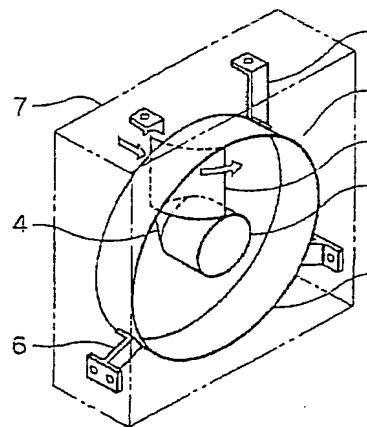
【図8】 円形フィンを同心円状に配設した従来の整流体およびその周辺を側面から見た模式図である。

【図9】 円形フィンを同心円状に配設した整流体の正面図である。

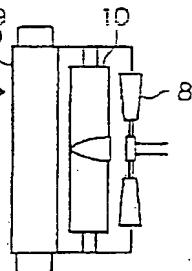
【符号の説明】

- 1 アウターリング
- 2 インナーリング
- 3, 8a ブレード
- 4 コーン
- 8 ファン
- 9 ラジエータ
- 10, 12 整流体

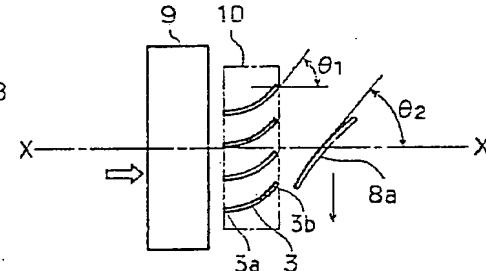
【図1】



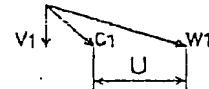
【図2】



【図3】



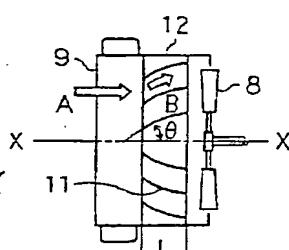
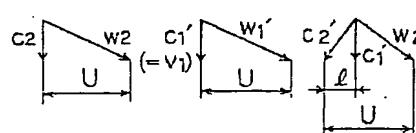
【図4】



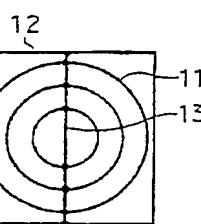
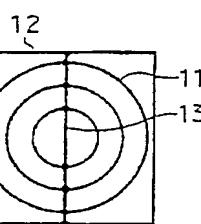
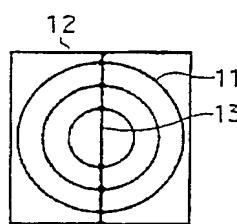
【図5】

【図6】

【図7】



【図8】



【考案の詳細な説明】**【0001】****【産業上の利用分野】**

本考案は、吸い込みファン用ラジエータ冷却装置に関する。

【0002】**【従来の技術】**

車両系建設機械、自動車、発電機等に搭載したエンジンの冷却水を放熱するため、前記エンジンの近傍にはラジエータが設けられ、エンジンの回転に伴って回転するファンによって発生する空気流が前記ラジエータのコアを通過することによって、コアチューブ内を流下するエンジン冷却水の放熱を行っている。前記ファンの外周に近接してファンとラジエータとの間にシュラウドが取着され、ファンの風量損失を防止している。そして、ラジエータのコアを通過する空気流の流速分布を均一化して熱交換を有効に行うため、図8および図9に示すように、複数枚の円形フィン11を同心円状に配設した整流体12をラジエータ9と吸い込みファン8との間に介在させたラジエータ冷却装置を用いることもある。

【0003】**【考案が解決しようとする課題】**

複数枚の円形フィンを同心円状に配設した従来の整流体を用いると、次のような問題点がある。

(1) 吸い込まれた外気がラジエータ9のフィンの隙間を出る時点における空気流の向きが、図8に示す矢印Aのようにフィンの隙間に平行、すなわちラジエータの中心線X-Xに平行であるのに対し、整流体12の入口部で矢印Bのように方向転換を余儀なくされるため、整流体12が空気流に対する抵抗体となってしまい、風量が低下する。前記抵抗を小さくするためには、ラジエータ中心線X-Xに対する円形フィン11の角度θをできるだけ小さくし、整流体12の軸方向長さLを非常に大きくしなければならない。また、円形フィン11の枚数を減らすと、ラジエータ9の風速分布を均一にする効果が低下してしまう。

(2) 整流体12を構成している同心円状の円形フィン11をそれぞれ所定の位置に固定するため、図9に示すように少なくとも1本のステー13を設ける必要

があるが、このステー13も空気の流れの抵抗体となり、風量の低下を引き起こす。また、空気の流れも乱れる。

【0004】

本考案は上記従来の問題点に着目してなされたもので、ラジエータを通過する風量の増大ならびに風速分布の均一化を図ることによって、有効な熱交換ができるような吸い込みファン用ラジエータ冷却装置を提供することを目的としている。

【0005】

【課題を解決するための手段】

上記目的を達成するため、本考案に係る吸い込みファン用ラジエータ冷却装置は、エンジン冷却水用ラジエータと、吸い込みファンと、前記ラジエータとファンとの間に挿着する整流体とからなるエンジン冷却水放熱装置において、前記整流体をアウタリング、インナリングおよび前記アウタリングとインナリングとの間に放射状に挿着する複数枚の円弧状のブレードによって構成し、前記ブレードはファンの出口における空気流の旋回成分を“0”ないし微小とする曲線形状を備えているものとした。また、このようなラジエータ冷却装置において、

整流体のインナリング内にコーンを装着することにより、ラジエータの風速分布を均一化することとした。

【0006】

【作用】

上記構成によれば、アウタリング、インナリングおよび複数枚の円弧翼状のブレードによって整流体を構成し、アウタリングとインナリングとの間に放射状に挿着するブレードを、ファンの出口における空気流の旋回成分を“0”ないし微小とする曲線形状を備えているものとしたので、ファン出口における空気流の旋回成分をファンによる静圧上昇に変えることができ、風量の増大が可能となる。更に、前記整流体のインナリング内にコーンを装着することにより、ラジエータの風速分布を均一化することができる。

【0007】

【実施例】

以下に本考案に係る吸い込みファン用ラジエータ冷却装置の実施例について、図面を参照して説明する。図1は整流体の斜視図で、整流体10は、アウタリング1の内周とインナリング2の外周との間に20～30枚の円弧状のブレード3を放射状に挿着し、インナリング2内にコーン4を装着したものである。前記アウタリング1は、複数の取り付けブラケット5、6を介してシュラウド7に固着されている。前記取り付けブラケット5、6の形状、寸法および取り付け位置には特に制約はなく、シュラウド7に整流体10を固着することができればよい。

【0008】

図2は整流体の周辺を側面から見た模式図、図3は吸い込みファンを用いてエンジン冷却水の放熱を行う場合の整流体とファンとの関係を平面的に示した模式図である。整流体10のブレード3は、ファン8のブレード8aの回転によってラジエータ9のコアに吸い込まれた空気流に抵抗を与えずにファン8に導くため、ラジエータ側端末部3aがラジエータ9の端面に対して垂直になる角度、すなわち、図3においてラジエータ9の中心線X-Xに平行になる角度に固定されている。ブレード3の曲線形状は、ファンの出口における空気流の旋回成分を“0”ないし微小とするような曲線形状を備えていて、ファン側端末部3bとラジエータ中心線X-Xとのなす角度θ1はたとえば50～60°で、ファン側端末部3bは図3において上向きに固定されている。ファン8のブレード8aは、ラジエータ中心線X-Xに対してたとえば50～60°のねじれ角θ2を有し、図の下方に回転する。ブレード8aの回転によってラジエータ9の外方から吸い込まれた空気は、ラジエータ中心線X-Xに平行に設けられたラジエータ9の空隙を通り、整流体10に流入する。そしてブレード3の曲面に沿って進み、ブレード8aによってエンジン側に流れる。

【0009】

上記整流体をラジエータと吸い込みファンとの間に挿着した場合、ファン入口における速度三角形は図4のようになる。同図において、 w_1 はファン入口相対速度、 c_1 はファン入口絶対速度、 v_1 は平均風速、 U はファンの回転速度（周速）である。また、ファン出口における速度三角形は図5のようになる。同図において、 w_2 はファン出口相対速度、 c_2 はファン出口絶対速度である。旋回成

分 I を “0” とするように整流体を配設した場合、ファンによる静圧上昇分を ΔP_{fan} とし、空気密度を ρ とすると、

$$\begin{aligned}\Delta P_{fan} &= 1/2 \times \rho (w_1^2 - w_2^2) \\ &= 1/2 \times \rho \{ (U + I)^2 - U^2 \} \\ &= 1/2 \times \rho (2UI + I^2) \dots \dots \dots (1)\end{aligned}$$

となる。一方、ラジエータと吸い込みファンとの間に整流体を配設しない場合のファン入口における速度三角形は図6のようになる。同図において、 w_1' はファン入口相対速度、 c_1' はファン入口絶対速度、 v_1 および I は図4の場合と同一である。また、ファン出口における速度三角形は図7のようになる。同図において、 w_2' はファン出口相対速度、 c_2' はファン出口絶対速度である。ファンによる静圧上昇分を $\Delta P'_{fan}$ とし、旋回成分を I 、空気密度を ρ とすると

$$\begin{aligned}\Delta P'_{fan} &= 1/2 \times \rho (w_1'^2 - w_2'^2) \\ &= 1/2 \times \rho \{ U^2 - (U - I)^2 \} \\ &= 1/2 \times \rho (2UI - I^2) \dots \dots \dots (2)\end{aligned}$$

となる。上記 (1) 式と (2) 式との差は、

$$\Delta P_{fan} - \Delta P'_{fan} = \rho I^2 > 0$$

従って、ラジエータと吸い込みファンとの間に本整流体を挿着すると、整流体を挿着しない場合よりもファンによる静圧が上昇し、静圧上昇分だけ風量が増大する。また、整流体の中心に配設したコーンにより風速分布を均一化することができる。

【0010】

整流体のブレード表面に吸音材を貼着すれば、シュラウドと整流体とによって形成されるダクト中を流れる空気流がもつ騒音成分が前記吸音材に吸収され、騒音を低減させることができる。

【0011】

【考案の効果】

以上説明したように本考案によれば、複数枚の円弧翼状のブレードをアウタリング、インナーリングの間に放射状に挿着するとともに、前記インナーリングの中に

コーンを装着して整流体を構成し、ファン出口の空気流の旋回成分が“0”ないし微小とするような曲線形状を前記ブレードに与えたので、ファン出口における空気流の旋回成分をファンによる静圧上昇に変えることができ、風量の増大が可能となる。また、インナーリング内に装着したコーンにより、ラジエータの風速分布を均一化することができる。このように、風量の増大とラジエータの風速分布の均一化とによって、エンジン冷却水の熱交換を有効に行うことができる。

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